

1 ~ 1. A surgical instrument comprising:

2 (a) a handpiece having a tool supporting end, and a battery  
3 receiving end;

4 (b) a battery pack having an attachment end;

5 (c) one of the battery receiving end and attachment end  
6 having an alignment post with a plurality of electrical contacts  
7 arranged concentric thereto, and the other thereof having a  
8 central opening defining a longitudinal axis with a set of  
9 electrical contact elements concentric to that axis; and

10 (d) wherein the two sets of contacts are adapted to become  
11 lockingly and conductively interengaged upon engagement of the  
12 alignment post with the central opening and in response to  
13 rotation of the battery pack relative to the handpiece.

2. A surgical instrument as in Claim 1 wherein the battery  
pack has chemistry based upon lithium/manganese dioxide, the  
battery pack after use being disposable into non-hazardous waste.

1           3. A surgical instrument for performing a cutting, shaping,  
2 or drilling operation on bone or hard tissue, comprising:

3           (a) a handpiece having a tool supporting end, and a battery  
4 receiving end with a set of electrical contact elements thereon;

5           (b) a sterile package containing a disposable battery, the  
6 battery chemistry being based upon lithium/manganese dioxide;

7           (c) the disposable battery having an attachment end with a  
8 set of electrical contact elements on its attachment end;

9           (d) the handpiece and the battery each having a defined  
10 longitudinal axis, each set of electrical contact elements being  
11 arranged generally concentric to that axis, and wherein in  
12 response to rotation of the battery pack relative to the  
13 handpiece the sets of contacts are adapted to become lockingly  
14 and conductively interengaged prior to the surgical procedure.

1           4. A surgical instrument comprising:

2           (a) a handpiece having a tool supporting end, and a battery  
3 receiving end with an alignment post extending therefrom, the  
4 battery receiving end of the handpiece also having a set of  
5 electrical contact elements arranged in generally concentric  
6 relation to the alignment post;

7           (b) a battery pack having an attachment end with a central  
8 opening therein, and a set of mating electrical contact elements  
9 arranged in a generally circular configuration concentric to the  
10 central opening;

11           (c) the sets of mating contacts being adapted to come into a  
12 mutually concentric relation in response to insertion of the  
13 alignment post into the central opening;

14           (d) the sets of contacts upon rotation of the battery pack  
15 relative to the handpiece being adapted to then become lockingly  
16 and conductively interengaged in a predetermined relative  
17 position; and

18           (e) means indicating by at least one of sight, sound, and  
19 touch that the predetermined relative position has been achieved.

1           5. A surgical instrument for performing a cutting, shaping,  
2 or drilling operation on bone or hard tissue, comprising:

3           (a) a handpiece having a battery receiving end with an  
4 alignment post extending therefrom;

5           (b) a sterile package containing a disposable battery pack  
6 which has an attachment end with a central opening therein;

7           (c) the central opening in the disposable battery pack being  
8 adapted to insertably receive the alignment post so as to  
9 establish a mutual alignment axis of handpiece and battery pack;

10           (d) the battery receiving end of the handpiece and the  
11 attachment end of the disposable battery pack having flat end  
12 surfaces adapted for abutting engagement while yet allowing  
13 relative rotation of the battery pack relative to the handpiece;

14           (e) the battery receiving end of the handpiece and the  
15 attachment end of the disposable battery pack having mating sets  
16 of electrical contact elements, each set being arranged generally  
17 concentric to the mutual alignment axis; and

18           (f) wherein upon the insertion of the alignment post of the  
19 handpiece into the opening of the battery pack, the sets of  
20 mating contacts are adapted to then become lockingly and  
21 conductively interengaged in response to rotation of the battery  
22 pack relative to the handpiece.

6. The apparatus of Claim 5 wherein the chemistry of the  
disposable battery pack is based upon lithium/manganese dioxide.

7. The apparatus of Claim 5 including means providing a spring-supported snap action whereby the sets of mating contacts become lockingly and conductively interengaged in response to rotation of the battery pack relative to the handpiece.

8. The apparatus of Claim 7 wherein the spring-supported snap action means provides an audible sound indicating that the mating contacts and the battery have been correctly and securely locked in position.

9. The apparatus of Claim 5 wherein the battery receiving end of the handpiece, and the attachment end of the battery pack, each has a non-circular external cross-sectional configuration, the two external configurations being closely similar in both size and shape, and the rotational position of the battery pack for locking the contacts being such that the handpiece and the battery pack then provide an essentially continuous external surface which indicates to the hand of the operator that correct alignment of the contacts has been achieved.

10. The apparatus of Claim 9 including means providing a spring-supported snap action whereby the sets of mating contacts become lockingly and conductively interengaged in response to rotation of the battery pack relative to the handpiece.

1           11. A surgical instrument for performing a surgical  
2 procedure on bone or hard tissue, comprising:

3           (a) a handpiece having a tool supporting end, and a battery  
4 receiving end with an alignment post extending therefrom, the  
5 battery receiving end of the handpiece also having a set of  
6 electrical contact elements arranged in generally concentric  
7 relation to the alignment post;

8           (b) a disposable battery having an attachment end with a  
9 central opening therein, and a set of mating electrical contact  
10 elements arranged in a generally circular configuration  
11 concentric to the central opening therein;

12           (c) the central opening in the disposable battery being  
13 adapted to receive the alignment post of the handpiece in a  
14 partially inserted position so as to establish a pre-attachment  
15 alignment thereof;

16           (d) the sets of mating contacts being adapted to come into a  
17 mutually concentric relation in response to a further insertion  
18 of the alignment post into the central opening; and

19           (e) the sets of contacts being adapted to then become  
20 lockingly and conductively interengaged upon rotation of the  
21 battery pack relative to the handpiece.

12. The apparatus of Claim 11 wherein the chemistry of the  
disposable battery is based upon lithium/manganese dioxide, and  
which further includes a sterile package containing the  
disposable battery.

1           13. A surgical handpiece for performing a cutting, shaping,  
2 or drilling operation on bone or hard tissue, comprising:

3           (a) a tool supporting end;

4           (b) an electric motor for driving a tool;

5           (c) a battery receiving end having a flat end surface with a  
6 defined central axis, and a circumferentially arranged set of  
7 electrical contact elements concentric to the axis;

8           (d) the flat end surface being adapted for abutting  
9 rotatable engagement by the electrical contact elements of a  
10 battery pack and to then provide a spring-supported snap action  
11 in response to rotation of the contact elements of the battery  
12 pack into a predetermined locking position; and

13           (e) the battery receiving end of the handpiece also having  
14 a non-circular external cross-sectional configuration to indicate  
15 to the hand of an operator that correct rotational alignment of  
16 the battery pack has been achieved.

17           14. A surgical handpiece as in Claim 13 wherein the central  
18 axis of the flat end surface is defined by an alignment post  
19 extending therefrom.

20           15. A surgical handpiece as in Claim 13 wherein the flat  
21 end surface at one point on its circumference has a stop pin for  
22 limiting the rotation of the battery pack relative to the  
23 handpiece.

16. A surgical handpiece as in Claim 13 wherein the electrical contact elements are made as spring members.

17. A disposable battery pack for attachment to the handpiece of a surgical tool, comprising:

3 a housing;

4 internal primary batteries within the housing;

5 the housing having a forward attachment end with a flat end surface adapted for abutting engagement with the end surface of 6 the handpiece while yet allowing rotation of the battery pack 7 relative to the handpiece;

8 the flat end surface having means defining a longitudinal 9 axis; and

10 a set of electrical contact elements on the flat end surface 11 concentric to the axis.

12 18. A disposable battery pack as in Claim 17 whose forward end has projecting flanges that are circumferentially unsymmetrical, so as to restrict its rotational position relative to the handpiece upon engagement therewith.

19. A disposable battery pack as in Claim 17 wherein the flat end surface has a central opening therein which defines the longitudinal axis, and which is adapted to insertably receive an alignment post of the handpiece.

20. A disposable battery pack as in Claim 17 whose chemistry is based upon lithium/manganese dioxide.

21. A surgical tool with detachable battery wherein the battery contains lithium/managanese dioxide, and is disposable after use into non-hazardous waste.

1 22. A surgical method comprising:

2       selecting a handpiece adapted for removable attachment of a  
3       battery pack thereto;

4       selecting a packaged and pre-sterilized battery pack  
5       containing primary batteries whose chemistry is based upon  
6       lithium/manganese dioxide;

7       attaching the battery pack to the handpiece to provide  
8       electrical energy for its operation;

9       conducting a surgical procedure utilizing the handpiece; and  
10      then disposing of the battery pack into non-hazardous waste.

23. The surgical method of Claim 22 wherein the selected surgical handpiece is a compact device containing a tool member, a brushless DC motor for moving the tool member, and a manually operated trigger for activating motor control operations.

24. The surgical method of Claim 22 wherein the selected surgical handpiece and the selected disposable battery pack have cooperating means for limiting the rotational position of the battery pack relative to the handpiece prior to their mutual engagement.

1 25. A surgical method of performing a cutting, shaping, or  
2 drilling operation on bone or hard tissue, comprising steps of:

3 (a) selecting a handpiece having a tool supporting end, and  
4 also having a battery receiving end with a set of electrical  
5 contact elements thereon;

6 (b) selecting a sterile package containing a disposable  
7 battery whose chemistry is based upon lithium/manganese dioxide,  
8 the battery having an attachment end with a set of mating  
9 electrical contact elements thereon;

10 (c) removing the disposable battery from the sterile  
11 package;

12 (d) conductively interengaging the sets of contact elements  
13 so as to provide energy for the handpiece;

14 (e) utilizing the tool to perform a surgical procedure; and

15 (f) thereafter detaching and disposing of the disposable  
16 battery into non-hazardous waste.

1           26. The method of Claim 24 wherein the handpiece and the  
2 battery are selected to have sets of contacts which are adapted  
3 to become lockingly and conductively interengaged upon rotation  
4 of the battery pack relative to the handpiece, in a manner that  
5 achieves correct alignment of the parts and also ensures stable  
6 mechanical attachment and support during the surgical procedure.

1           27. A surgical method comprising the steps of:  
2            (a) selecting a handpiece having a tool supporting end, and  
3 a battery receiving end with electrical contact elements thereon;  
4            (b) selecting a disposable battery having an attachment end  
5 with electrical contacts adapted to engage the tool contacts;  
6            (c) rotatingly locking the battery to the handpiece to  
7 conductively interengage the sets of contact elements, while  
8 concurrently creating a positive indication by at least one of  
9 sight, sound, and touch that a predetermined locked position has  
10 been achieved; and  
11           (d) thereafter utilizing the tool to perform a cutting,  
12 shaping, or drilling surgical procedure on bone or hard tissue.

1           28. The method of Claim 27 wherein the battery is selected  
2 to have its chemistry based upon lithium/manganese dioxide.